TRADITIONAL KNOWLEDGE SYSTEM OF ARABLE AND HABITABLE TERRAINS OF THE PROVINCE OF GUIMARAS

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ABSTRACT Traditional knowledge played a critical role in farming systems in the past. People relied on what the environment could only offer, making practices sustainable. It is essential to recognize and document the practices of the past generations as this helps attain agricultural sustainability. Hence, the study on the traditional knowledge system of arable and habitable terrains of Guimaras was conducted to determine the rituals, beliefs, and practices related to farming, sustainable farming techniques, practices, access, utilization, conservation of land and its resources. Traditional knowledge and relevant data are obtained directly through interviews, communications, observations, taking images, recordings, etc., from the communities themselves. Primary commodities considered in the study were suha (calamansi), kasoy (cashew), paho (mango), rice and coconut. Documented traditional knowledge on suha (calamansi) production includes paghunol (marcotting), pag-arado kag pagpakaras (plowing and harrowing), paminhi, planting of hunol, pag-abono, mulching, paghilamon (weeding), pagkapon (pruning), pest and disease management, flower management, pagdugos (harvesting), marketing, and intercropping. Suha production is partially inorganic, and mulching creates a big impact on sustainability. Traditional practices in kasoy (cashew) production also include palutaw/ palutawon, seed color, and deshelling. Processing cashew can be in the form of salted nut and bandi, which have a high market value. Further, traditional practices on mango production include paaso (smudging), paglabo sa puno (hacking), traditional way of determining flower and fruit indices, climbing techniques such as palawa, use of bamboo ladder. Furthermore, traditional practices in rice include buray and linas. Threats in practicing buray includes, soil erosion, strong winds, stray animals and drought. Additionally, traditional coconut production practices have pagpananggot and pinarak using buri palm. Pagpananggot is still practiced in few rural areas in Guimaras and is a source of tuba and vinegar for rural community.

Keywords: traditional knowledge, arable, habitable, Guimaras

INTRODUCTION

Traditional knowledge (TK) is a network of knowledge, beliefs, practices, and traditions intended to preserve, communicate, and contextualize indigenous relationships with culture and landscape over time. It represents a viable knowledge system that was the basis of old and developing societies (Wyenberg, Scroeder & Chennels, 2009). It is interchangeably used as indigenous knowledge (IK) that is used to describe any information, knowledge, innovation, or practices of the local indigenous communities that is of relevance in ensuring the conservation and sustainable use of biodiversity (Warren, Slikkerveer Brokensha, 1995; Amend, 2008). It covers all species of plants, animals, and micro-organisms and variations between them, which form an intangible component of the ecosystems they are part of (Semali & Kincheloe, 2002; Berkes, 1999; Berkes, Colding & Folke, 2000). It includes oral narratives that recount human histories; cosmological observations and modes of reckoning time; symbolic and decorative methods of communication; techniques for planting and harvesting; hunting and gathering skills, specialized understandings of local ecosystems, and the manufacture of specialized tools and technologies (Bruchac, 2014). It is developed and passed on from generation to generation in the form of stories, songs, cultural values, traditional laws, local languages, rituals, healing arts, and agricultural practices for the collective good of the communities (Huntington, 2000; Brucha, 2014).

Traditional knowledge (TK) can be a local context, practice-based, traditional and indigenous and endogenous with self-education, learning by doing and social interaction. Informal farmers' knowledge comes from their experimentations and practical experiences on the farm, holistic approach, own by the local community, and locally specific solutions (Šūmane et al., 2018). Local people developed their practice of resource use on their perspective based on their experience and knowledge (Berkes, Colding & Folke, 2000). Traditional knowledge systems have a broad view of the ecosystems and sustainable ways of using natural resources. However, the colonial education system replaced the practical everyday life aspects of indigenous knowledge and ways of learning with Western theoretical knowledge and academic ways of learning. Today, there is a grave risk that much indigenous knowledge is being lost and, along with it, valuable knowledge about ways of living sustainably both ecologically and socially (Senanayake, 2006). The rapid change in the way of life of local communities has primarily accounted for the loss of TK. Younger generations underestimate the utility of traditional knowledge systems (TKSs) because of the influence of modern technology and education (Ulluwishewa, 1993 cited by Ngulube, 2000).

The use of TK is now considered one of the cornerstones that can guarantee the survival of the developing

world's economies in the wake of scarce resources. Its use is essential in ensuring cultural resiliency in communities, developing the consciousness of each individual in protecting the environment for sustainable development, and conceptualizing localized

policies and intervention (Nkomwa, Joshua, Ngongondo, Monjerezi & Chipungu (2014). Therefore, TKs must be gathered, organized, and disseminated systematically as Western knowledge (Agrawal, 1995; Gonzalez, 1995 as cited by Ngulube, 2000). Recently, there have been no documented traditional knowledge systems on arable and habitable terrains of Guimaras. Therefore, to revitalize the core of Guimaras culture and traditional knowledge systems, these knowledge must be documented.

METHODOLOGY

Traditional knowledge and relevant data are obtained directly through interviews, communications, observations, taking images, recordings, etc., from the communities themselves. The identification of the respondents was done informally by discussing traditional knowledge system with the barangay officials and asking them to identify people with traditional practices in their localities with reference to arable and habitable terrains. For indigenous people, community or tribe chief, the elder, the shaman, an individual farmer, a community council, or whatever formal representative person or body was contacted to engage and transmit data and information in the form of TK. Respondents were interviewed alone in their working environment or at their respective homes. The interview was conducted informally and concentrated on traditional knowledge on rituals, beliefs and practices related to farming, sustainable farming techniques and practices, access, utilization, conservation of land and its resources. Where necessary, informants who could not be found at the houses were interviewed at their duty stations separately.

RESULTS AND DISCUSSION

Suha (*Citrofortunella microcarpa*) production

Suha (*Citrofortunella macrocarpa*) belongs to the citrus family and is native in the Philippines. The tree is low set, spreading, and well-branched. The leaves are broad, oval, and dark green to pale green on the upper and lower surfaces. The fruit is usually small and round, ranging from 1.0 to 3.0 inches in diameter. The rind may be thin or thick.

Suha is commonly propagated asexually through marcotting. Marcotting is one of the oldest forms of plant propagation where 30-50 cm of the tree's bark is removed from the branch and replaced with moistened soil wrapped tightly using a plastic sheet to allow rooting to produce one independent tree for planting. In Guimaras, the common practice is to asexually propagate suha since the method is very simple and can be carried out by anyone involved in calamansi production.

Several indigenous practices noted in suha production need documentation and preservation to complement organic agricultural production.

Paghunol (Marcotting).

Suha is generally propagated through *paghunol* (marcotting). In doing paghunol, a young twig of suha has to be chosen to serve as *hunol* (marcot). Then, remove the bark around the twig with a 30-50 cm length close to the base of the selected twig. The cut be must deep enough to get into the cambium layer (soft material between the bark and the wood). Then, the cut will then be covered with a handful of native earthworm casts or bunot (coconut husk) collected within the farm. According to the farmers, earthworm casts are used as these materials are cool and fertile, containing many beneficial organisms. The earthworm casts or bunot will be placed at the middle of the piece of plastic sheet enough to cover the cut area. Then they will be wrapped around the ringbarked area, tying first the bottom and then the top. The hunol will then be allowed to produce roots for 1.5 to 2 months. At this time, the hunol will have enough roots. It can now be detached from the main stem and become an independent plant. Paghunol is usually done during March to May. In that case, the hunol can be immediately planted in the field. If the paghunol is done from December until February, bagging of hunol is necessary to avoid mortality. Hunol will be detached on February to April, during the dry season.

The end product of vermicomposting utilizing earthworms is a finely ground vermicompost with nutrients in available form along with growth promoters and microorganisms and its application both at laboratory and field levels have proven to bring about better crop growth and yield. The end product of vermicomposting utilizing earthworms is a finely ground vermicompost with nutrients in available form along with growth promoters and microorganisms and its application both at laboratory and field levels have proven to bring about better crop growth and yield.

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Native worm casts almost have the same properties as vermicomposts. According to Karmegam and Daniel (2009), the end product of vermicomposting is a finely ground vermicompost with nutrients in available form along with growth promoters and microorganisms. This is supported by the study of Karmegam and Daniel (2009) in their

study entitled "Effect of application of vermicasts as layering media for an ornamental plant, Codiaeum variegatum". They found out that the use of vermicast as medium for air layering C. variegatum significantly increased root initiation, root length, total number of roots developed, fresh and dry weight of the roots. This indicated that vermicast is an excellent medium for C. variegatum layerage.

Paminhi/ Panudlak.

For the Ati (Aeta, an indigenous group), paminhi/ panudlak (asking permission and blessing from the spirits) before planting is still a practice. They have this belief that before planting they have to ask permission and blessing from spirits for them to have abundant harvests. They are also employing this practice immediately before planting hunol of suha. The first hole where the hunol will be planted will be filled with stones (maximum of 5 pieces). These stones, according to them, signify the production of bigger fruits and abundant harvest. Then, they pray that all that they have planted will be blessed.

This practice is different from the panudlak as noted by Jocanto (2008). He noted that farmers are doing this mostly in rice and corn in his book. The farmers perform several activities as part of the ritual or panudlak, that the Ati here in Guimaras do not practice. In his study, he noted that farmer have to make seven holes before planting. The stone then is placed beside each hole and the seeds are planted into the holes and covered with soil. After covering the holes, the farmer step on it and facing east he shouted loudly asking for abundant yield from the spirits.

Planting of hunol. According to one farmer, hunol should be planted facing the east. In that case, the tip of the plant will receive enough sunlight necessary for the plant's growth and development. For Ati people, planting of hunol should be done during hunas (low tide) and during the time when cumulus clouds are forming. In the absence of a calendar to determine hunas, the Ati people check on the eyes of the cat. When the pupil is thin or has a thin diamond shape, it is lowtide. However, when it becomes bigger or rounder, it means high tide. Likewise, when the wind continuously blows, it is low tide, and when it stops, it is high tide.

Pagkapon (Pruning). It is practiced to remove lawi-lawi (water sprout) and unwanted branches such as diseased, dead interlacing branches using scissors and pruning shear. Lawi-lawi is a vigorous upright shoot from an adventitious or latent bud on a tree's trunk or main stem. Lawi-lawi should not be allowed to grow as it decreases branching continuously.

Pagkapon mainly aims to allow branching. To avoid wasting lawi-lawi when doing pagkapon, farmers utilize this plant part for marcotting. In that case, this plant part will be used as hunol for another planting, expansion, and marketing round. For farmers, pagkapon usually done to promote good branching and renew branches and provide good air circulation and enough sunlight within the canopy of suha.

Pest and Disease Management

The common pests observed in suha production are fruit fly (Bactrocera philippinensis), green waya-waya, brown waya-waya, and bao-bao. These pests are typically observed from October until November and seldom observed during the summer. According to the farmers, fruit flies infest fruits by laying their eggs that eventually damage fruits through rotting and manifest through premature yellowing and falling of fruits. Waya-waya and bao-bao feed on the leaves and sucks the leaves' juice, which eventually results in yellowing of leaves. To control pests, concoction made of a combination of tubli (Derris elliptica), manunggal (Quassia indica), and katumbal (Capsicum frutescens) are thoroughly crushed and soaked overnight with one (1) gallon of water to be sprayed on the infested plants. It will then be sprayed twice on the plants: in the morning and in the afternoon.

One common disease observed in suha production is "tagok sa puno" or gummosis. Gummosis is a fungal disease caused by Phytophthora citrophthora. The stem or trunk affected by this disease release gums or sticky substance on the surface of the infected areas. The infected part will be removed and burned away from the field to prevent the disease from spreading to the unaffected plant parts.

Flower Management

Suha should not bear fruit until it reaches three years old. Every time the plant bears flowers at a young age, the flowers should be removed from the plants. According to the farmers, this is done to prevent the plant from bearing fruits at a young age. They wanted to allow the plants first to be mature enough to bear fruits. When the plant reaches its maturity at more than three years old, it is allowed to continuously flower and bear fruits.

Pagdugos (Harvesting). Pagdugos is usually done four (4) months after flowering. It is done through hand picking. During pagdugos, most harvesters bring pail or pandak (10kg capacity container made of woven bamboo slits) as immediate containers for fruits harvested in the field.

Once the pandak or pail is complete, the fruits will be transferred to the papag (sorting table) placed within the farm premises close to the harvesting area. When the fruits are placed on the papag, the sorters classify the fruits into marketable and non-marketable fruits. Marketable fruits are those that are not injured and have good size and

color. Non-marketable fruits are damaged, have ripe or yellow fruit peels, and kusog (not well-developed).

After sorting, marketable fruits are placed inside the fishnet instead of inside the kaing (woven container made of bamboo slits) bigger than pandak. This is so to avoid the fruits from experiencing lap-os (bruised fruits) while transporting the fruits from the farm to the local or regional market.

Sustainability. The practices currently employed in suha production play an important role in agricultural sustainability in the Province of Guimaras. The practice is partially inorganic, but the utilization of farm residues in crop production creates a big impact on sustainability. First, the farm produces no waste. The farm residues are valuable these days, considering that they are important in preserving soil moisture, particularly during dry season, and maintaining soil fertility and soil health. Second, the farm helps reduce greenhouse gas emissions, considering that burning farm residues is no longer practiced. When farm residues are not burned, there is much less chance of greenhouse gas emissions. Third, it reduces pollution (including air, water and soil) as the production practices gradually omit synthetic pesticides and fertilizers.

Threats. Suha production is one of the potential agricultural industries in Guimaras Province. However, some threats might hamper the success of this industry. One of the known threats is the possible lowering of price of suha fruits in the market. In the past several years, suha industry had been very promising in the province. However, when the price went down, the industry also weakened. According to the farmers, this is one of the significant threats they wish will not happen again.

Another threat viewed for the industry is the aging suha farmers. Like rice farmers, suha farmers in Guimaras Province are also aging. There are very few young generations who have an interest in agriculture. Even the children of the suha farmers are not into farming. Hence, the current generation of aging suha growers has no successors. The industry will eventually fall once the suha farm enterprise has no successors.

Guimaras "Kasoy" Cashew

"Isa ka prinsesa nagapungko sa tasa" is an old famous riddle known by Filipinos that depicts " kasoy " characteristics. Cashew (Anacardium occidentale L.), locally known as 'kasoy', is one of the most important nut crops in the Philippines. This crop is versatile in theood and feed industry (Magboo, 1998). This was first introduced worldwide by Portuguese explorers in South America in the 16th century. In 2002 cashew was ranked as number 1 the nut crop globally (Meyer, n.d.). In Guimaras, it is one of the abundant crops aside from mango (Province of Guimaras n.d.) and according to Mr. Sustituido, Mitra variety is the common cashew variety here in Guimaras

Palutaw/Palutawon. This method involves soaking the seed in the water to determine the filled/unfilled seed or premature kernel. This method shows that those seeds that floated after being soaked in water, more or less, have unfilled space or have early grain inside, which gives it the buoyancy effect. However, not all floating seeds have been rejected because some expert "manugkasoys " know if the floating seed has still kernel inside by just looking and weighing the seed with their hands: this technique is known as "Pamata."

Seed Color. Seed color is another method used to determine seed maturity. A mature cashew seed commonly has greenish gray color. Seed maturity is an important factor that affects the nut's quality and taste.

Deshelling of Cashew. The cashew seeds are sun-dried before deshelling. This is for the proper and easy removal of the shell. Sun drying the seeds takes around 2 to 4 days, depending on the seed situation. Sun drying turns the seed shell and kernel hard and compact, making the shell easy to cut and kernel easy to remove. On the other hand, one of the concerns in cashew deshelling is the presence of liquid in a cashew nutshell. This liquid coming from the shell can cause blisters if contact with the skin. To solve this constrain, applying cooking oil in the hands is one of the alternative ways to avoid the direct contact of the cashew nutshell liquid in the skin.

Significance. Cashew is considered a potential crop industry in Guimaras. Aside from mango, it also has different processed products such as salted nut and bandi which have a high market value. Likewise, this crop has a high nutritional food value. The cashew fruit contains a high concentration of vitamins C, carotenoids, phenolic compounds, and minerals (Cavalcante et al., 2005). The kernel contains antioxidant, good fat, and magnesuim for a healthy heart (Meyer, n.d.). Moreover, disregarded cashew fruit serves as an alternative feed for cattle, chicken, and swine most of the time.

On the other hand, gathering and picking of cashew is just a hobby for some children. One can see them collecting cashew seed along the road, making fun of it, or working together with their friends, to, which some earn by selling those seeds.

Status. The cashew nut production in Guiramas is mainly on a backyard basis, and there are only a few engaged in orchard plantation. The demand is high for both local and export markets for cashew, especially the unprocessed ones. However, due to the inability to meet the demand in quantity, the cashew industry is not sufficient to enter such a market.

Threat. The more the number of trees you have on a backyard basis, the more seeds you can get. But, because of the pag-uling (wood charcoal-making practice) in Guimaras, which is very common, the number of cashew trees tends to decrease, reducing seed production. Aside from that issue, climate change is also one of the threats in cashew production, particularly during the reproductive phase. Climatic factors on cashew study of Balogoun, et al (2016) reported that the unpredictable and unseasonal rain during the dry season could resulin unfavorable environmental conditionson and high incidence of pest and disease developme, leadingds to the cashew plants' failure to develop flower.

Mango (Paho)

Paaso (Smudging). Paaso is a Hiligaynon term referring to smudging. It is a traditional-cultural method of inducing the mango flower using smoking/fogging. The technique involves burning local plant materials (fresh and dried, e.g., shrubs, grasses, tree branches, etc) under the mango tree canopy. The dried materials are first ignited, filling the fresh ones to increase smoke formation. Moreover, paaso takes almost 2 weeks straight, starting from morning until afternoon, and it is mostly done during dry season or mango season.

On the other hand, in some areas where there is a presence of strong wind, people practice the use of kumbong (wind barrier) using amakan (bamboo mat) or lukay (coconut leaves), which is placed against the direction of the wind. This to prevent the smoke from being blown away from the tree canopy.

Significance. Scientifically, paaso in mango had been considered necessary during early days. The smoke produced from burned plant materials contains endogenous ethylene, a plant hormone that stimulates flowering. During smudging, smoke containing ethylene, which comes from the burned plant material, is absorbed by the leaves and is utilized by the plant to induce flower formation (Sandip et al., 2015). Moreover, it also serves as an insect/pest repellant to prevent diseases brought about by insect/pest infestation.

Status. Today, paaso is still practiced but only to act as pest repellent, However, the use of kumbong is not practiced anymore. Due to the discovery of chemical inputs in farm production, most people have now converted into using the modern farming system. The use of chemicals for flowering and pest control, which is more efficient, leads them to abandon the old practices.

History/Evolution. The paaso is a known traditional method for flower induction in early times. The scientific evidence has already been found behind this method. When the chemical approach in agriculture became popular around 1980s, the use of chemical flower inducers gradually changed the old practices of mango production in Guimaras. According to Roberto Galon, in 1973, the Provincial Department of Agriculture conducted a training about chemical flower inducers and pesticides for mangoes, wherein, after the training, the participant spreaded the information and technology to other farmers. Furthermore, he added that, in 1982, a method in the induction of mango flowers known as kalburo (calcium carbide) was brought by the people from Sta. Barbara. This powdered chemical is applied in the tree's base or between the branches by making a hole using drills and inserting the powder inside. However, years after using this method, people discovered the side effect of this chemical. They observed that the part to which they applied this chemical was gradually rotting. Additionally, according to Cerilo Tiniklan and Rodito Galpo, the Calburo application was introduced in Guimaras around late 1950s by people from Cabatuan.

Paglabo sa Puno (Hacking the Mango Trunk). Paglabo sa puno (hacking the trunk) is a traditional method to induce mango flowering and other fruit trees. It is performed by slashing the surface of the trunk using wasay (axe) or binangon (bolo) during fruit season before flowering. Moreover, people in early times observed that slashing the tree trunk during its season induces its flower. In addition, elders in Guimaras have a verbal expression about paglabo (hacking). When the fruit trees don't show any signs of flowering during its season, they say "pahuga bala" which means you need to stab the tree for it to produce flowers.

In scientific terms, Mr. Yonder, Center Chief of Guimaras National Crop Research Development and Promotion Center, explained that wounding inflicts a stress effect to the mango wherein it causes the initiation of flower induction. In addition, according to Haldankar et al. (2014), the removal of cambium, which is a common feature of girdling and hacking, will lead to plant stress and result to high production of ethylene in the plant. Due to the release of this hormone, the production of flowers tends to increase.

Meanwhile, today, hacking is still practiced in some parts of Guimaras, but very few apply it in mangoes as it is commonly done in jackfruits. Due to the invention of formulated flowering chemical in mangoes, most farmers discontinued using this method.

Flower and Fruit Indices in Mango Production

Flower and fruit indices in mango production are vital factors in the mango industry. The use of indexes to determine the proper time of method application is crucial to achieving the desired quality of the product. The benefits of visual and numerical estimates are the primary method for determination.

Flower Induction Indices. Applying a chemical flower inducer is always a question to mango farmers or growers. Four common indices are used to determine if the plant is ready for chemical flowering application. These indices are (1) dark green color of the leaves, (2)"pagkumos sang dahon" (leaf squeezing) – if the leaves produce a crackling like sound while squeezing, it means that it is ready for flower induction, and (3) bulging of shoot tip.

Fruit Maturity Indices. Maturity is an essential factor that affects the quality of the product. The ideal maturity of a mango fruit is considered a vital factor in production because it affects the fruit's sweetness and shelf life. The fruit maturity indices are (1) flattening of shoulders and fullness of cheeks, (2) the presence of "bloom" or powdery deposit, and (3) yellow-green color near pedicel and yellowing of pulp.

Climbing Techniques

In the absence of modern machines used to facilitate climbing tall trees, Filipinos employ traditional and improvised climbing methods, mainly when conducting fruit bagging and harvesting. In Guimaras it is popularly known as the "palawa".

Palawa is a Hiligaynon term that means hanging in a web; the person doing the method mimics a spider. The palawa involves two important persons: the one doing the palawa and the other who controls the rope, known as the "timon". Moreover, the person performing the "palawa" harnesses themselves in a knotted rope called "sakayan". The sakayan has a structure called bandoler, where the person is tied.

To do "palawa" is quite a hard work. According to Jay-R Igpuara, a 19-year-old resident from Gaban, San Lorenzo, Guimaras, a person should be skilled enough to perform "palawa". As for him, he needed a month of rigid training to join the "palawa" team. However, for Nelson Gonzaga, 29 years old, also from Gaban, he was only trained for a day and could go with the group after that. They were both trained by the family Sakayan whom they believed were the ones to introduce the technique in Buenavista. They said that "palawa" in Guimaras originated in Nueva Valencia, Guimaras.

According to Art Liarte, 21 years old from East Valencia, Buenavista, Guimaras, who acted as "timon" during the interview, "sa kada puno nga may nagapalawa, importante gid kaayo nga may isa ka "timon" para sa safety sang naga-"palawa". So, the two "palawa" groups have their own "timon" to ensure the safety of the baggers.

Use of Ladders. Team Tanag (who employs both "palawa" and ladders for bagging and harvesting) said that the use of ladder is much safer than doing "palawa" and the outer portion of the canopy with fruits can be bagged appropriately. According to Rolando Sanchez, 59 years old, and the Tanag team of baggers leader, when the fruits for bagging are located at the lower portion of the canopy, the ladders are used. Still, when they are at the highest portion, the member who knows the skill for "palawa" does the job. The group uses both two-post and three-post ladders. They can bag as high as 20 feet using ladders.

For Bating group, Rolando Niego, 52 years old, said that they are only using a ladder to reach the highest portion of the canopy. None in their group knows how to do "palawa" but sometimes, when they cannot get the highest part of the canopy, one of their group members climb the tree without any harness to do the bagging. The group uses both one-post and two-post ladders.

Significance. Fruit bearing trees, particularly centennial and old grafted mango trees, are tall enough to climb. Having a crane to facilitate the ease of bagging is impossible here in Guimaras. When doing fruit bagging and harvesting, hired labor to perform the job should know the techniques to complete the job successfully. Hence, various traditional methods emerged to ease climbing trees for fruit bagging and harvesting. The methods developed through time are essential for the mango industry in Guimaras as bagging and harvesting are not yet mechanized.

Status. Different indigenous maturity indices in mangoes are still practiced in Guimaras Province. However, fruit maturity indices like Days After Flower Induction (DAFI), fruit color and Total Soluble Solids using refractometer ensure the fruits are ready for harvest. The fruits are of good quality if harvesting of fruits is at the right age and maturity,

The practice of fruit bagging and harvesting techniques is common in the whole Province of Guimaras. Various teams informally organize themselves to be hired for bagging and harvesting, and they use different techniques based on their members' skills.

In Buenavista and San Lorenzo, the Cagay Team from East Valencia, Buenavista is known to perform bagging and harvesting through "palawa". They have 8 members in the group. Seven (7) people do the "palawa" and one (1) person serves as timon. The Mantasik team of Gaban, San Lorenzo is also known to practice such and they are

composed of 7 members (one timon and 6 baggers). Mixed "palawa" method and the use of ladders is practiced by Tanag team which is composed of 18 members (10 people use ladders and 5 people do the "palawa" and they said they can climb trees 20-feet high). For Team Bating in San Pedro, Buenavista, the group uses purely ladder to do the bagging and harvesting.

History/Evolution. The "palawa" technique for climbing trees was known to have originated from Nueva Valencia, Guimaras. This was according to the observations of the key informants. However, the younger key informants were trained by the Sakayan family who came from the Province of Negros Occidental. On the other hand, paper in fruit bagging became popular around the late 80s. According to the respondents, this practice was adopted from Cebu.

Rice Production Practices

Buray. "Buray" is a Hiligaynon term referring to a method of planting known as dry seeding of rice seeds which is usually done on uplands immediately after the onset of rainy season or last week of April or May. Before the rain comes, farmers prepare the field by doing arado (plowing) and pakaras (harrowing) three times across the slope to reduce erosion. The arado and pakaras are alternately conducted. Before the subsequent plowing, farmers first allow the weeds to grow a bit taller and then plow afterward. Harrowing is then done immediately after plowing. After which, the farmers wait for the first or second rainfall that indicates the start of the rainy season. Once the first or second rain falls, the field will be immediately plowed and buray will be simultaneously done with plowing. Before doing buray, the seeds are mixed with fertilizers to ensure that the sown seeds will have enough nutrients for initial growth and development in the field. Buray is done by placing the rice seeds following the idas (furrow) made through plowing. The seeds sown through buray are then covered with sul-ay (the soil scooped up during plowing) to ensure that birds and other animals do not damage the seeds. For other farmers, covering of seeds is done with their bare feet. When they do the buray, they sow the seeds along the idas (furrow), and scrape the sul-ay using their feet to cover the sown seeds.

Significance. The practice of buray in upland rice farming is essential for the farmers as it helps ensure food security during the lean month of August. According to the farmers, when they practice buray during April or May, they have enough rice for subsistence during August. However, they cannot harvest rice in August when they wait for June to start planting. Hence, the farmers will not have enough supply of rice, which then leads them to buy their rice supply, for personal consumption, from the market.

Status. Until recently, buray is still practiced in Guimaras Province, especially in upland rice farming areas. This is one of the important means employed by upland rice farmers to produce food during the month of tig-gulutom (August).

Structure/Meaning/Function. The practice of buray is only done in once every cropping per year to ensure rice harvest during August. It functions to produce rice harvest in August, usually considered to be a lean month in rice production.

Sustainability. Usually, lowland rice production for first cropping starts during May or June in rainfed areas. Farmers have to wait for the rainy season to prepare their fields for the first cropping season. To ensure that the rice has ample moisture or water for growth and development, farmers usually do sab-og sa binati (wet seeding). With sab-og sa binati, rice can be harvested during September or October. Hence, most of the people engaged in lowland rice farming will have a minimal supply of rice during August (a period where the supply of rice is scarce hence the price per kilogram is costly). However, with the practice of buray in upland rice farming, the farmers will have enough rice for subsistence and excess produce for market sale until the harvesting period for the first cropping season starts. Hence, the practice is still actively practiced in upland rice farming as it addresses problems on rice insufficiency during the lean month period.

Threats. As a farming method in rice production, farmers cited the following as threats for practicing buray:

Soil erosion: Buray is practiced in upland areas. Soi degradation will happen with continuous soil cultivation in the uplands. Buray is only practiced once every year To reduce the effect of soil erosion.

Strong winds: Strong winds affect grain filling. Farmers cited that the grains become upahon (unfilled) when strong winds blow during the grain-filling period.

Stray animals: Normally, there are many farm animals raised in uplands. Most of the upland rice areas are not surrounded with fences. Therefore, the area is open for stray animals to graze and trample.

Drought: Drought is also cited as one of the threats to the practice buray as drought will eventually reduce yield or even result to zero production.

Linas. "Linas" is one of the oldest traditional methods of rice threshing. This involves using bare feet or draft animals to thresh the crop. The harvested rice straw is spread over a mat or sack and trampled with feet to separate the grain from the straw.

Significance. Nowadays, most of farmers opted for mechanized threshing due to its efficiency compared to the traditional method. However, for a farmer with a small land area like Belenda Artosilla who practices salapi/ratoon, linas are considered economically practical in terms of cost for threshing.

According to Nanay Belenda, "salapi" or ratooned rice typically have lower yields than seedling rice production. If they rent a machine for threshing the yield they can get cannot compensate the cost of rental of machine, therefore, they prefer to use the traditional method. In that case, Nanay Belenda opted to use linas to thresh her harvest. m single planting and rice matures earlier.

Status. Currently, "linas" is still a practice in Barangay Getulio particularly for Nanay Belenda who only owns a small parcel of rice land.

History/Evolution. Long before the development and utilization of farm machineries in agriculture, "linas" had been used as method for threshing grains. However, due to the insufficiency in terms of time and productivity of this method, most farmers now prefer to use mechanization.

Structure/Meaning/Function. "Linas" involves using bare feet or draft animals to thresh the crop. The harvested rice straw is spread over a mat or sack and trampled with feet to separate the grain from the straw.

Coconut Production and Management Practices

Pagpananggot. Pagpananggot (toddy tapping) is one of the coconut management practices that denote harvesting of tuba (coconut toddy). A person performing pagpananggot is known as mananggete (toddy tapper). The work of mananggete is not an easy task. The person should be equipped with climbing skills, to be able to climb tall coconut trees, and expertise in observing the behaviour of the palm where he is harvesting tuba. To do pagpananggot, a mananggete needs coconut trees with ready to tap suwak (spadix). Suwak is composed of inflorescence and sheath or spathe that covers the inflorescence). To collect tuba (coconut toddy), the mananggete needs, kawit (a container made of cut bamboo pole with a wooden handle hung on the shoulder of the mananggete used to collect tuba during harvest), pasok (a container made of cut bamboo pole attached to the suwak which is already tapped to collect tuba), patik (a bamboo stick used to clean the pasok), sanggot (sickle) for tapping suwak, bol (a container made of cut bamboo pole used to measure the amount of tuba to be marketed) and ginit (coconut leaf sheath used to filter tuba).

Significance. Doing pagpananggot is very important as it produces tuba necessary for making vinegar and lambanog. At present, there had been various commercially produced vinegars and liquors, yet tuba is still very important for the community. The community prefers natural vinegars made out of tuba and prefers tuba compared to wine or liquors commercially available in the market.

Status. Pagpananggot is still practiced in a few rural areas in Guimaras and is a source of tuba and vinegar for the rural community.

Structure/Meaning/Function. To perform pananggot, the following are the activities to be observed:

Selection and preparation of suwak for tapping. The suwak used for pagpananggot is usually properly selected and prepared to ensure the successful collection of tuba from the coconut trees. According to the mananggete, to successfully collect tuba from the suwak, one shoule observe the folowing:

1. Bend daily the suwak (those with inflorescence still covered with spathe) two inches from its most recent position. This is conducted to train the suwak before collecting the tuba. The suwak must be already on its bent position when collecting tuba to flow directly to the pasok continuously. The tuba will not be collected successfully once the suwak is not bent correctly during the collection period. The tuba will flow back to the suwak causing the suwak to get rotten. Hence, training the suwak to bend is essential.

2. Always check the ikatlo nga manghod or third sibling from the older suwak as basis for tapping. Once the ikatlo nga manghod is already balangit (one normal finger span), the farmer is assured that tuba will just continuously flow once the suwak has begun to be tapped.

Tapping and collecting of tuba. The mananggete climbs coconut trees in the morning and afternoon. Once the suwak has been selected and is ready for tapping, the mananggete cuts the tip of the suwak using the sanggot. As previously mentioned, he always observes the length of the third sibling of the suwak to make sure that the tuba

will be successfully collected. After cutting its tip, the pasok will be attached to collect the tuba draining out from the suwak. The suwak is tightly tied to ensure that the inflorescence will not disintegrate when the pasok is connected. The tip of the suwak, with an attcahed pasok, is then covered with ginit to prevent rain from mixing with the tuba. For Mr. Gabiota, tapping and collection of tuba is done every afternoon as this time is more convenient for him.

Harvesting tuba. He climbs the coconut tree when harvesting with his kawit (with patik inside) attached to his shoulder and sanggot tied to his waist. When he reaches the tip of the coconut tree, he collects the tuba and pours it inside the kawit. Once the pasok is already empty of tuba, the mananggete uses the patik to take out the sediments inside the pasok and strike the patik on the coconut leaf petiole several times removing the residues taken from the pasok.

According to Mr. Gabiota, to make the tuba sweeter, he changes the pasok three times a day, which means that he is not, in a day, using the same pasok to collect the tuba. Instead, he uses three pasoks and changes the pasok three times a day. However, he has to climb the coconut tree several times a day, which is very tiring.

Likewise, he has observed that he usually has a poorer harvest of tuba when the wind direction changes from time to time in a day. However, when the wind direction is the same throughout the day, he is assured of a good harvest.

Storing and marketing of tuba. After being harvested, the tuba inside the kawit will be poured into a 20-liter container for storage and marketing. The harvested tuba is measured using a bol (that contains 600-700 ml). Hence, the cost is based on this measurement when selling it directly from the farm. For Mr. Gabiota, his harvested tuba is sold directly to his sister's retail (sari-sari) store.

Sustainability. Tuba is one of the most important beverages, particularly for the rural people. Rural people, especially men, used to gather and meet the mananggete or a place where tuba is sold every afternoon, after work, to socialize with colleagues and friends. They used to talk and spend time together over tuba. Drinking tuba is somehow a stress reliever for male workers. It also promotes good relationships among the people in the community.

Likewise, tuba is also used to make lambanog, a wine with much higher liquor potency than tuba. Tuba is also used to make vinegar. A fermented tuba is used to cook various Filipino dishes. Hence, tuba production is very sustainable in terms of sustainability as it is one of the important beverages and cooking ingredients until today. It is therefore essential to preserve the coconut industry to sustain pananggot.

Threats. Based on interviews, the following are considered threats to pagpananggot:

Weather. When the weather is bad, the mananggete could not collect quality tuba and enough volume for harvest. When there is heavy rainfall, the quality of tuba will be affected because it will be infused with rainwater. Also, there is not enough harvest if there is a subsequent heavy downpour or typhoons.

Apart from that, if the wind direction does not favor the flow of tuba from the suwak, the harvest will be low. As previously mentioned, when the wind direction within a day changes from time to time, the yield will be low. If the wind direction is the same within a day, the harvest is abundant.

Commercial liquors and vinegar. There are a lot of commercial liquors and vinegars in the market today that the community now consumes commercial varieties. Hence, the existence of these products in the market negatively affects the marketability of tuba and tuba by-products as these products are not as competitive compared to commercial liquors.

Dying coconut industry. In the past, Guimaras had a vast coconut plantation. However, because of residential and commercial establishments and developments, coco lumber is widely used as construction materials. In these cases, rampant cutting down of coconut trees to be made into lumber was observed in the Province of Guimaras. Very few of the coconut farm owners practice replacement or replanting of coconut trees. Therefore, it resulted to the decreasing number of coconut tree plantations in the province and a limited number of coconut trees for tuba production through pagpananggot.

Buri Palm Sugar

Pinarak/Padak or Kalamay sa Buri. Pinarak is a processed sugar of "buri palm" scientifically known as Corypha utan. The extracted liquid (tuba) from the heart of palm or "ubod sang buri" is collected and cooked by heating until the liquid turn into sticky sugar form.

The process usually starts by clearing the crown of the palm tree by removing some of the leaves and plant debris. The crown (upper part) will be cut to get into the heart of the palm (ubod) and then, the outside circumference of the ubod will be tied (pikitan) using the leaf petiole of buri. In collecting the liquid, a surab (bolo) is used to carve the core of the ubod. The carve shoul be concave with a canal structure.

The collected tuba, gathered for four hours after the liquid has started flowing from the ubod, will be immediately boiled to avoid "pasar" (over fermentation that leads to vinegar formation). Make a thin layer of ubod to make an

open wound that helps induce the liquid flow. These processes will be repeated with an interval of four hours until such time that the palm has no more juice left to be extracted. Moreover, in every dawat (collection of tuba) the liquid will just be added to the previously gathered ones, boiled again until it produces bubbles to stop the heating.

On the other hand, one of the practices to enhance the flowing of tuba sang buri (liquid extracted from the ubod) is the use of kutitot nga katumbal (hot peppers). After the scraping of ubod, these hot peppers are rubbed to the surface of the newly wounded ubod. The pinarak producers have observed that it prolongs and induces the flow of liquid. The cooking process will be done every two days (48 hours collection of tuba). More than two days of collection is not good because it allows for the longer period fermentation of the previous collection, resulting in pasar and dulit (pinarak which is sticky and not dried after it is cook).

The collected liquid will be cooked by boiling and then added with coconut meat (kinagod nga bukayuon nga lubi) for additional flavor (hamot kag mananam). The liquid will be continuously stirred during the cooking process using a rulugay (a wooden laddle characterized by its long handle with an oblong shape structure at the tip). Then, when the tuba turns into sticky sugar, this will be put into a kaha (a square-shaped container measured at around 8x8x1.5cm made from bamboo leaf) using palita (flat wooden spoon) will be left to cool and dry.

Significance. Pinarak was considered a delicacy by the Guimarasnons. This sweet delicacy has been a part of the Guimarasnon food table for more than a century. Likewise, pinarak is in-demand for local and international consumption commonly brought abroad by those people who have relatives here in Guimaras who bring pinarak as they return.

Status. Pinarak-making is still practiced in Guimaras, particularly in the municipality of Nueva Valencia. The production usually starts from December to May or towards the dry season. However, since the packaging property of pinarak is poor, the product's availability for export market is not accessible and fails to meet the proper protocol of food and safety standards.

Furthermore, the number of buri palm is now decreasing, primarily due to pinarak production. However, for most of our respondents, pinarak production is the most productive use of a buri palm even though there is a consequence that the tree will die afterward. Also, since only few still use the leaves of buri for banig-making, it is also challenging to collect the leaves of buri when it is tall. Moreover, the wood of this tree is not suitable for lumber production because it is weak and easily destroyed.

History/Evolution. According to most of our respondents, Igang, Nueva Valencia, Guimaras is the place of pinarak in Guimaras. The Gaugano family is one the oldest families to practice pinarak-making. Moreover, as stated by Danilo Gaugano, his ancestor from Tigbauan and Antique were the ones who brought the practice of pinarak-making in Guimaras.

In Tigbauan, they used coconut shells as container of pinarak before. When Guimaras invented the kaha, people adopted the new packaging style from other areas. Moreover, in Tigbauan, they added gata sang lahing, while here in Guimaras we use kinukudkud nga bukayoon nga lubi.

Other Terms:
Padakan – term used to describe a place where there is pinarak-making
Tarakos – a wood instrument used to measure the size of kaha
Pisgil – single-post bamboo used as ladder in climbing a buri

CONCLUSIONS

It is evident that some local farmers still practice traditional farming methods that have to be documented and preserved. These traditional practices normally worked not against the environment but in complementary with the environment. The farmers' beliefs on the spiritual dimension and their respect for nature are important keys to environmental sustainability that has to pass from the present generation to the next continuously. In this manner, sustainable development in agriculture will be realized. Agricultural production and management have to work harmoniously with nature by applying and integrating traditional knowledge. Hence, researchers may incorporate traditional knowledge systems in agricultural production studies. Likewise, LGUs may consider developing policies on preserving and utilizing traditional knowledge systems.

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